REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*

2. REPORT TYPE
Technical Papers

3. DATES COVERED *(From - To)*

4. TITLE AND SUBTITLE

Please see attached

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

5d. PROJECT NUMBER
2302

5e. TASK NUMBER
M1G2

5f. WORK UNIT NUMBER
346120

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Air Force Research Laboratory (AFMC)
AFRL/PRS
5 Pollux Drive
Edwards AFB CA 93524-7048

8. PERFORMING ORGANIZATION REPORT

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Air Force Research Laboratory (AFMC)
AFRL/PRS
5 Pollux Drive
Edwards AFB CA 93524-7048

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S NUMBER(S)
Please see attached

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

20030129 194

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:

a. REPORT	b. ABSTRACT	c. THIS PAGE	17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
Unclassified	Unclassified	Unclassified	A		Leilani Richardson
					19b. TELEPHONE NUMBER *(include area code)* (661) 275-5015

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. 239.18

G-2.

MEMORANDUM FOR PRS (In-House Publication)

FROM: PROI (STINFO) 22 May 2002

SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-VG-2002-128**
C.T. Liu (PRSM), "Investigating the Effects of Specimen Thickness and Pressure on the Crack Growth Behavior of a Particulate Composite Material"

ASME Winter Meeting **(Statement A)**
(Blacksburg, VA, 24-28 June 2002) (Deadline = 19 June 2002)

1. This request has been reviewed by the Foreign Disclosure Office for: a.) appropriateness of distribution statement, b.) military/national critical technology, c.) export controls or distribution restrictions,
d.) appropriateness for release to a foreign nation, and e.) technical sensitivity and/or economic sensitivity.
Comments:____________________________________

Signature ____________________ Date ____________

2. This request has been reviewed by the Public Affairs Office for: a.) appropriateness for public release and/or b) possible higher headquarters review.
Comments: ____________________________________

Signature ____________________ Date ____________

3. This request has been reviewed by the STINFO for: a.) changes if approved as amended,
b) appropriateness of references, if applicable; and c.) format and completion of meeting clearance form if required
Comments:____________________________________

Signature ____________________ Date ____________

4. This request has been reviewed by PR for: a.) technical accuracy, b.) appropriateness for audience, c.) appropriateness of distribution statement, d.) technical sensitivity and economic sensitivity, e.) military/ national critical technology, and f.) data rights and patentability
Comments:____________________________________

APPROVED/APPROVED AS AMENDED/DISAPPROVED

____
PHILIP A. KESSEL Date
Technical Advisor
Space and Missile Propulsion Division

Investigating the Effects of Specimen Thickness and Pressure on the Crack Growth Behavior of a Particulate Composite Material

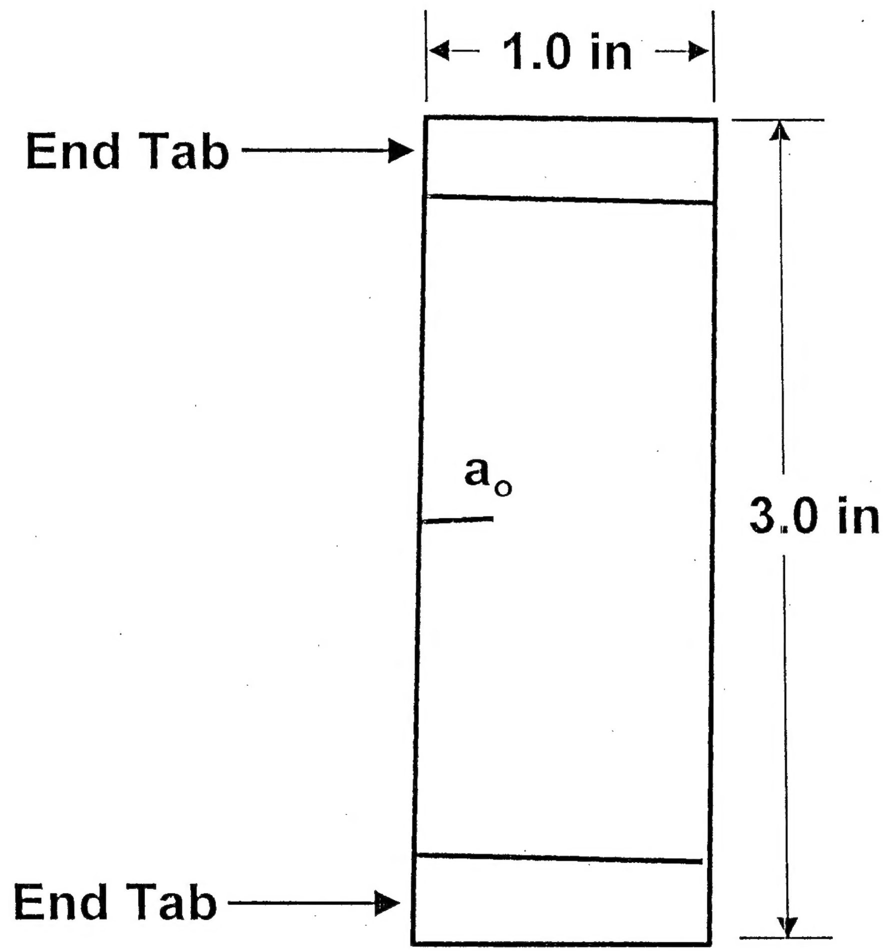
C. T. Liu

Principal Research Engineer

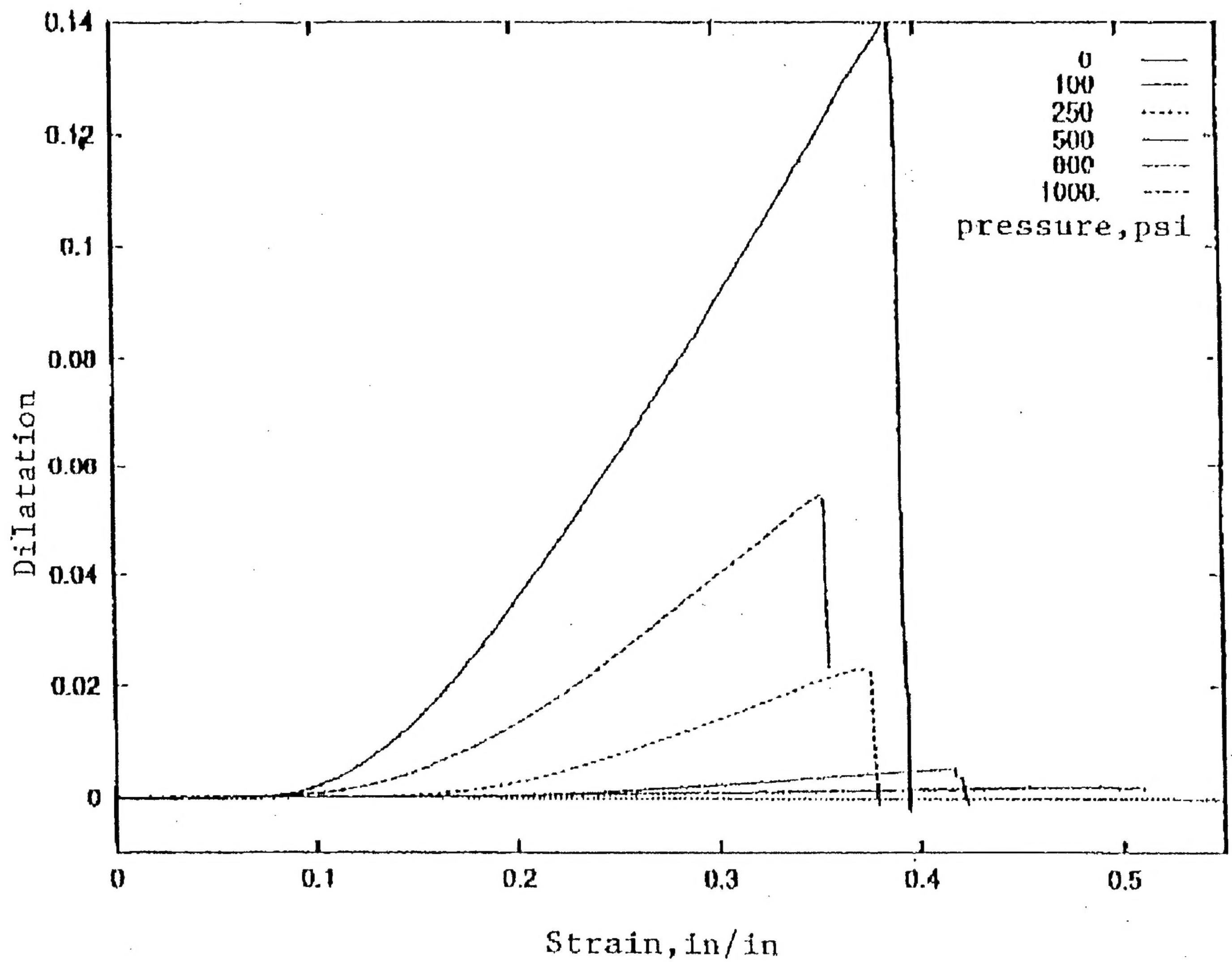
PRSM

Air Force Research Laboratory

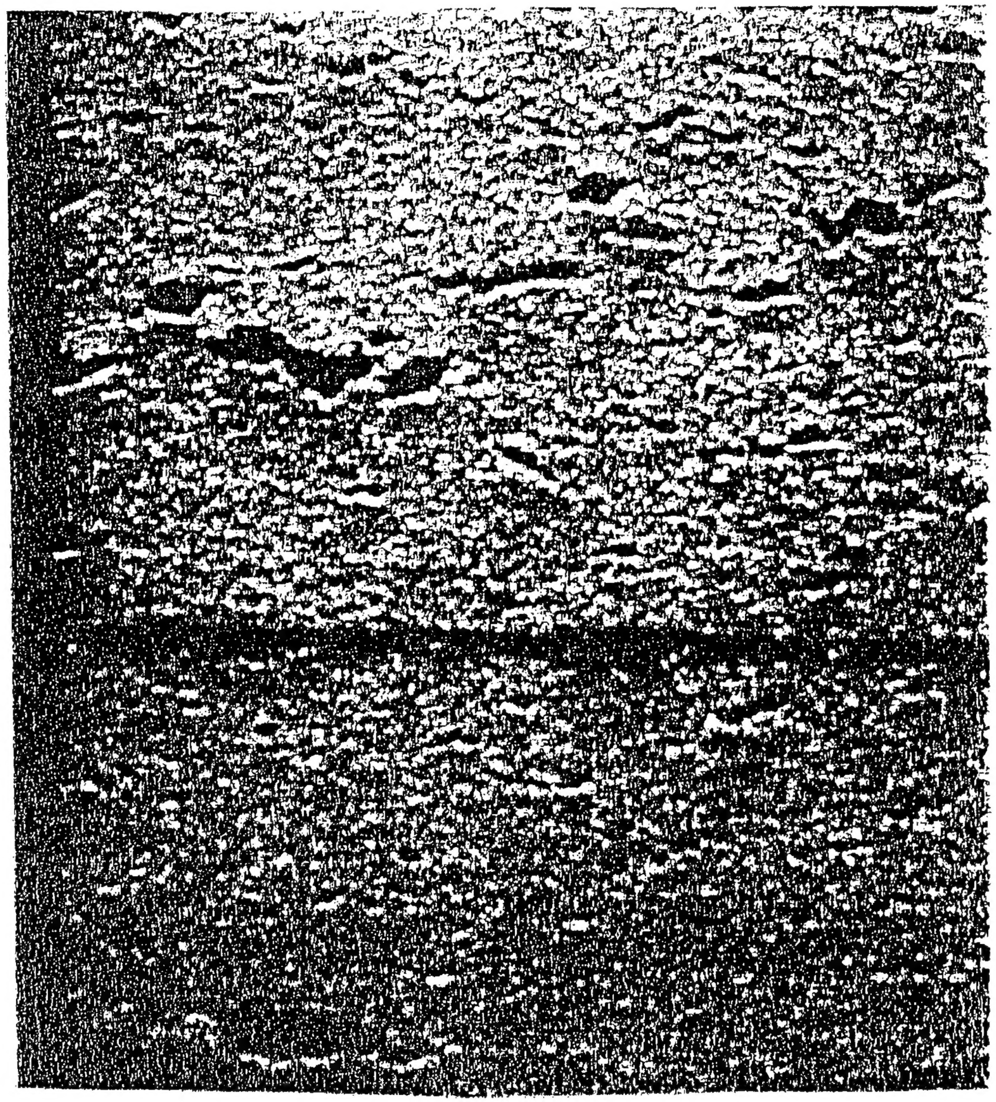
Specimen Geometry



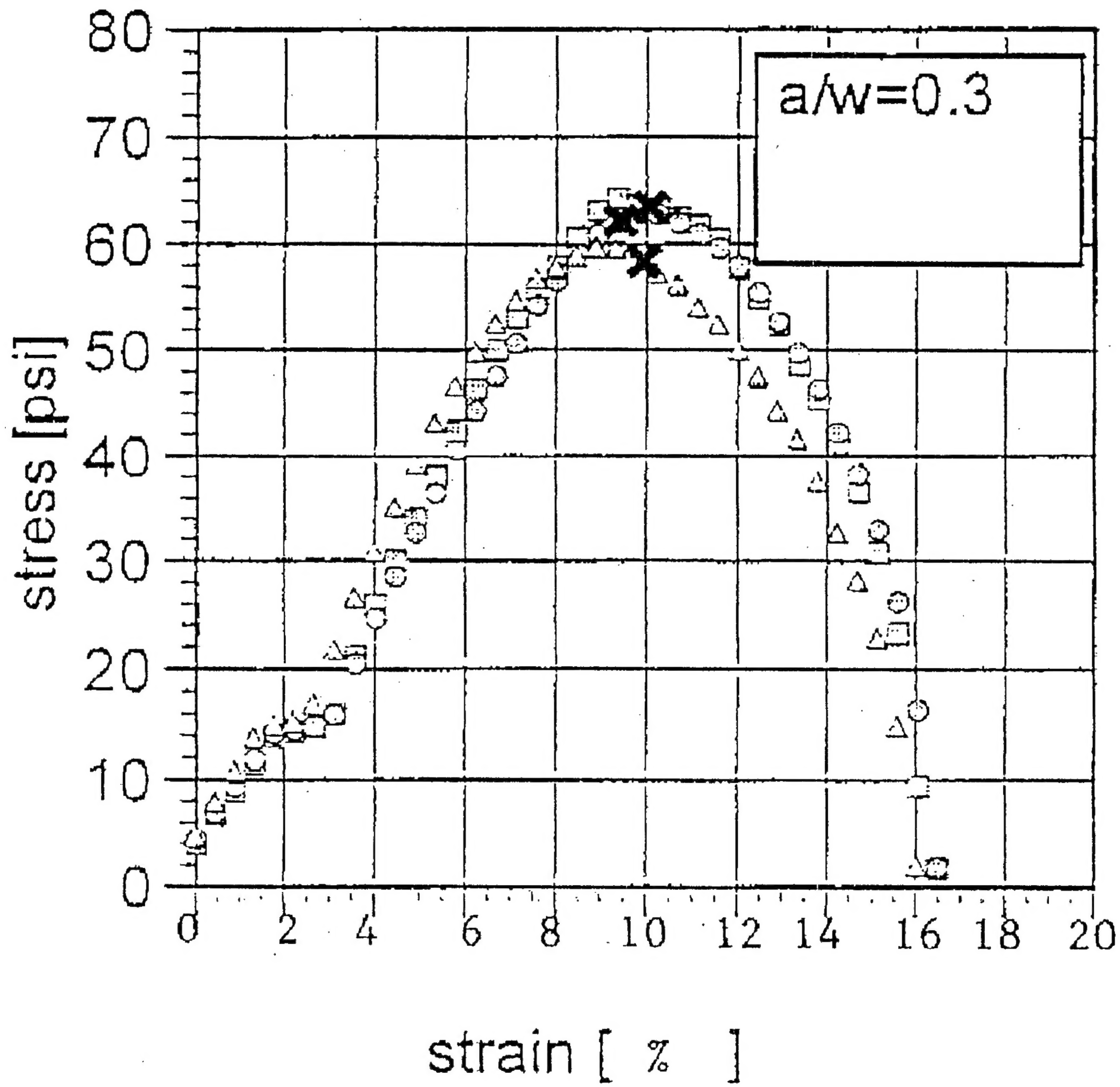
Volume Dilatation vs. Pressure



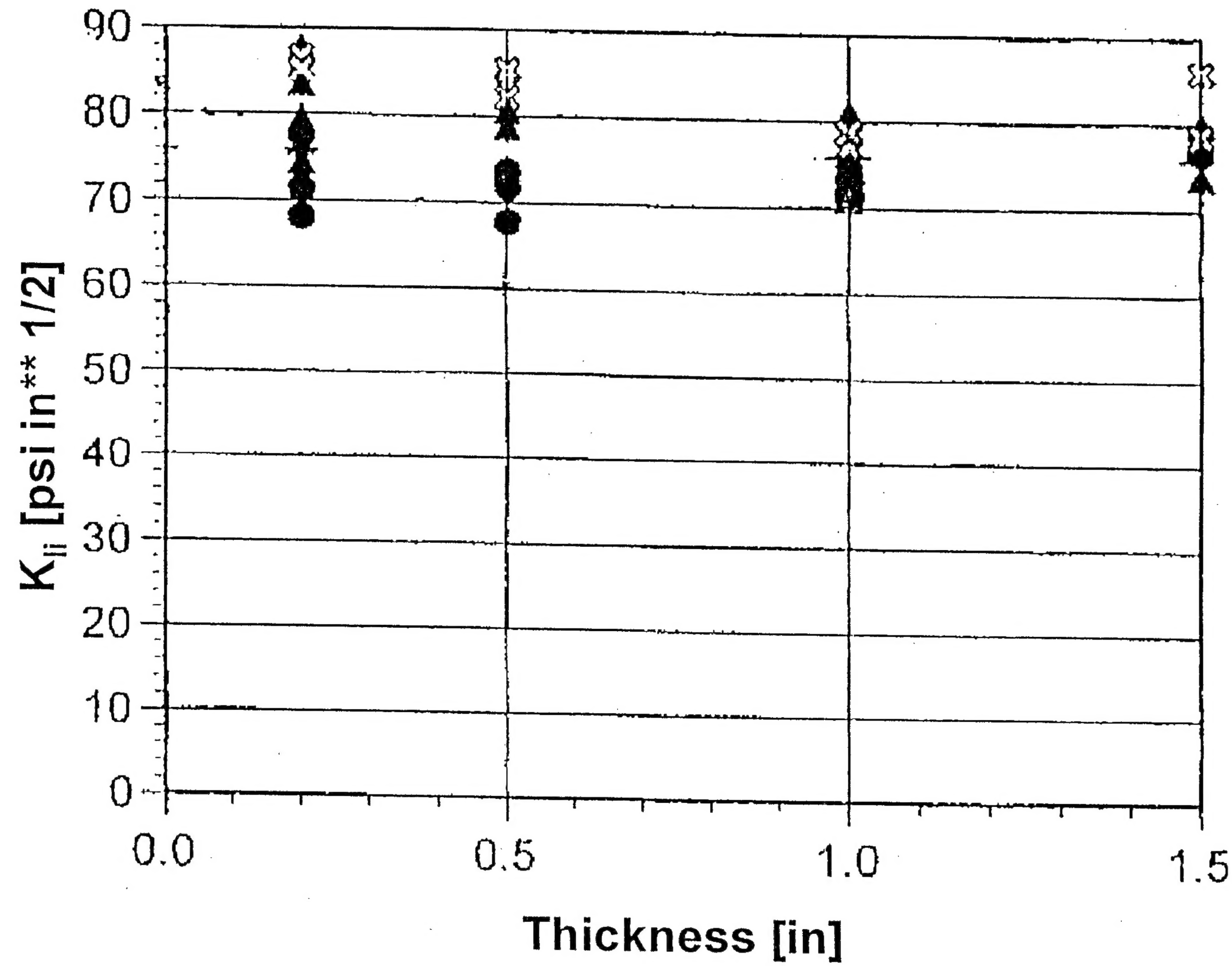
Microcracks in the Specimen under Pressure



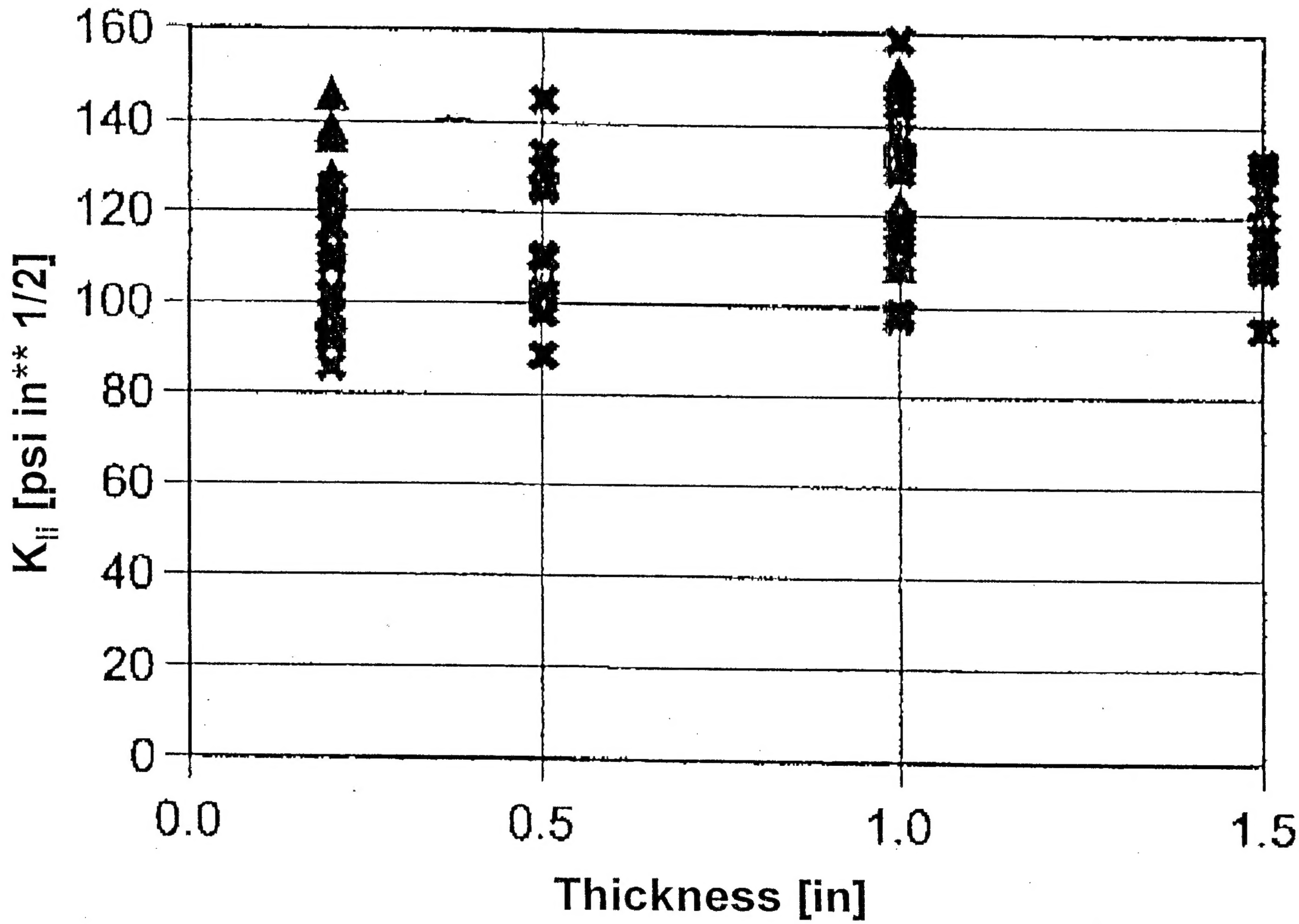
Stress-Strain Curves under Ambient Pressure



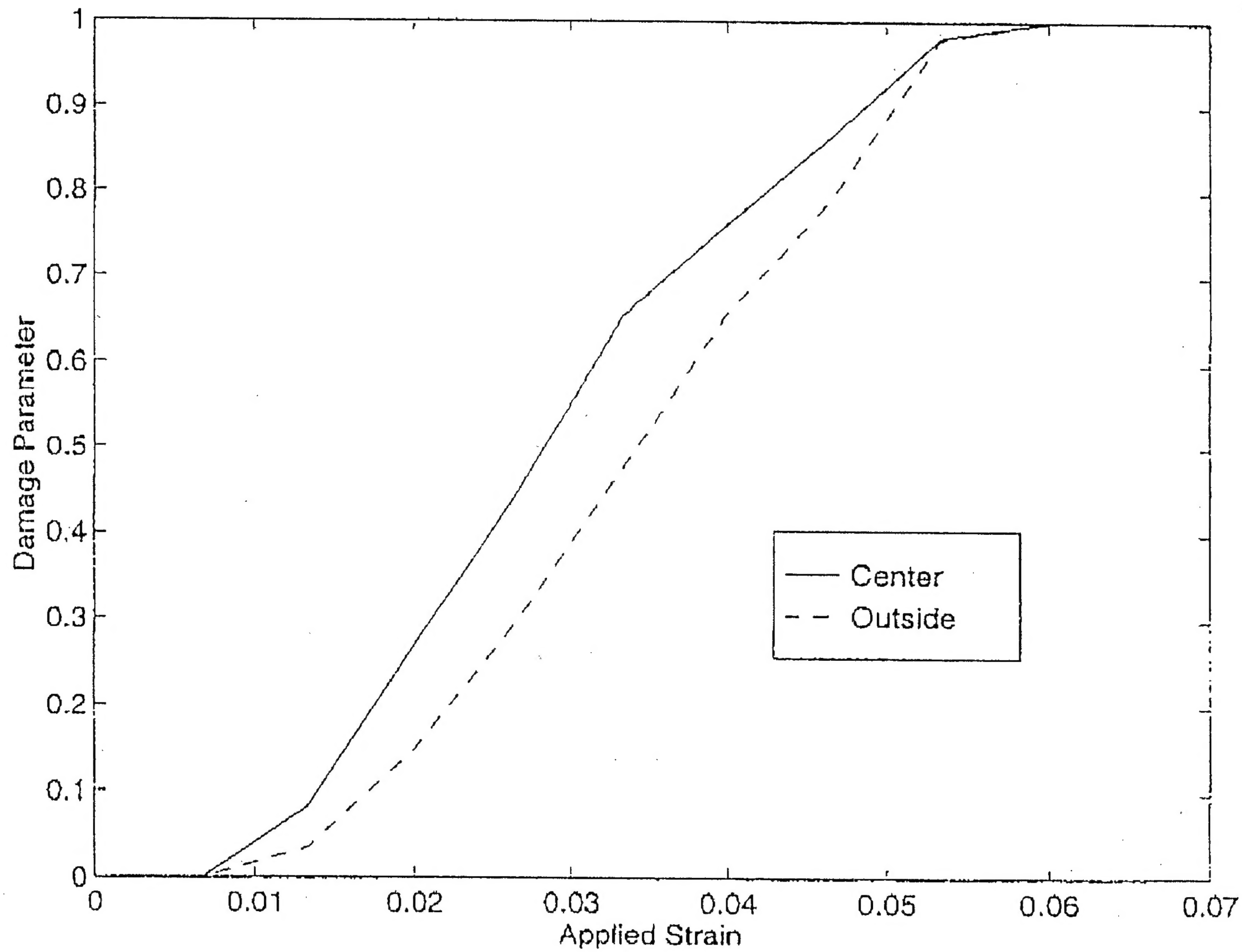
Mode I Stress Intensity Factor vs. Specimen Thickness. (Ambient Pressure)



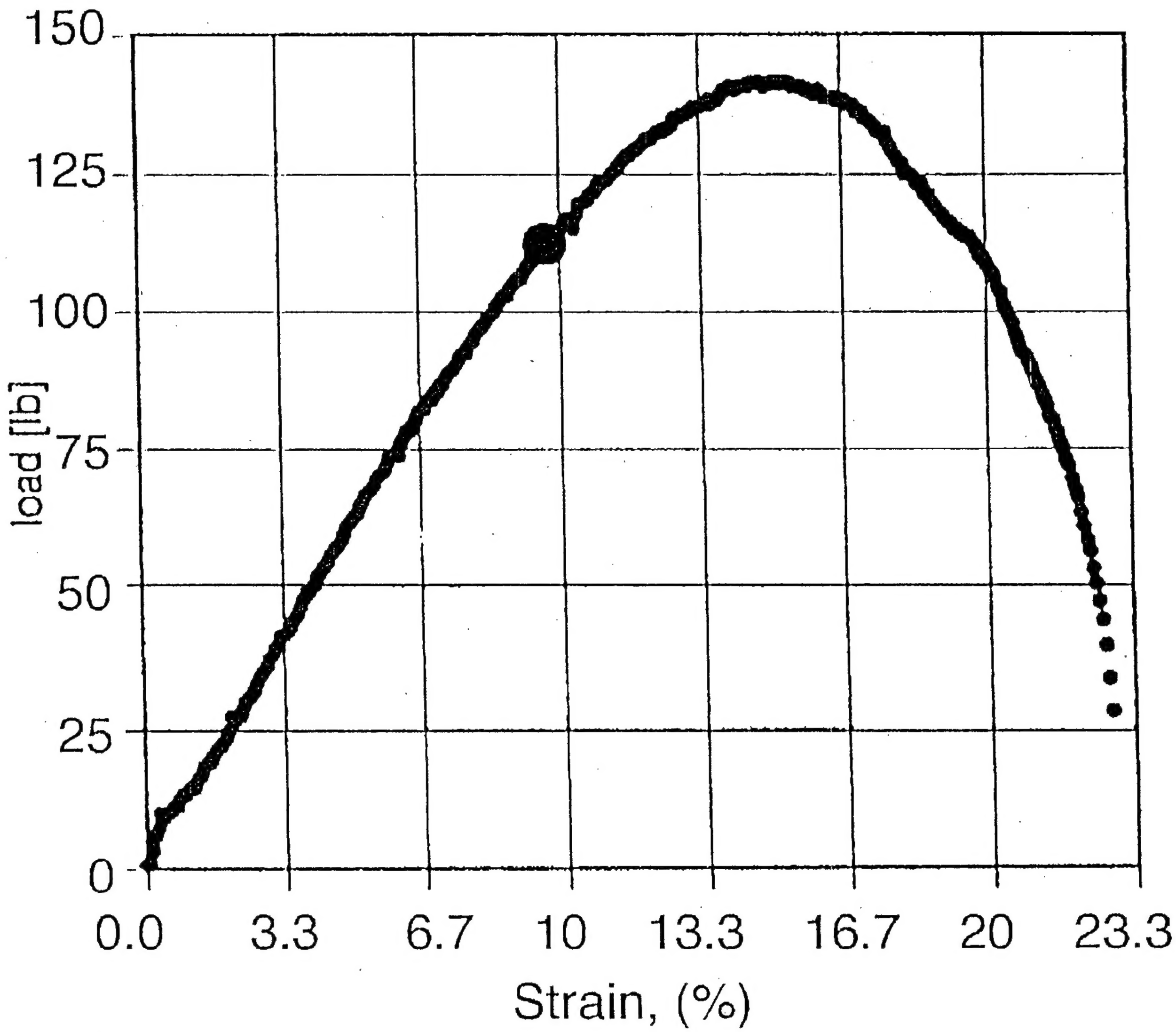
Mode I Stress Intensity Factor vs. Specimen Thickness. (1000 psi Pressure)



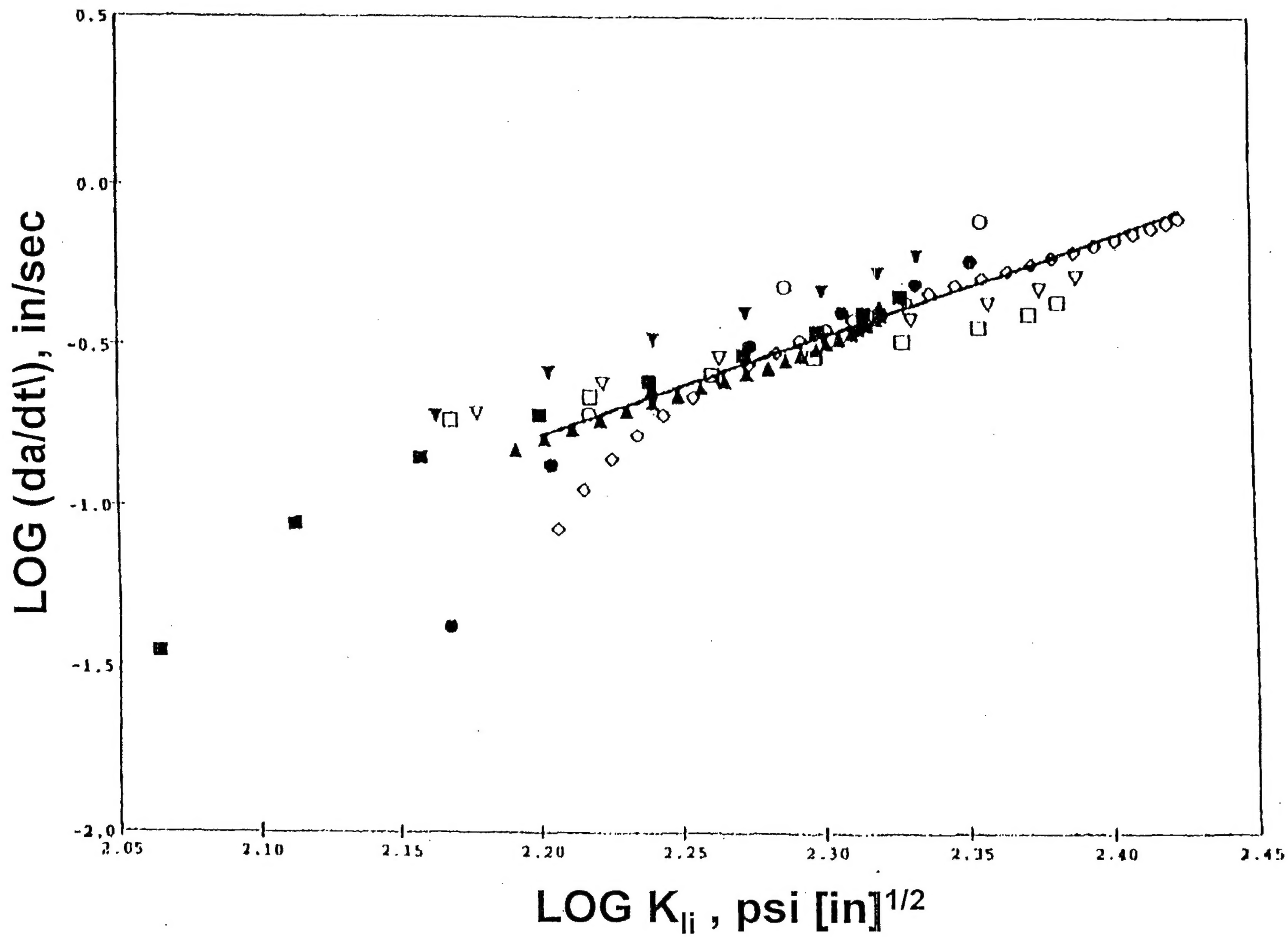
Damage Distribution near the Center and the Surface of the Specimen



Stress-Strain Curve under 1000 psi Pressure



Crack Growth Rate vs. Mode I Stress Intensity Factor



Conclusions

1. The critical Mode I stress intensity factor, K_{Ii}, for the onset of crack growth is insensitive to the specimen's thickness.
2. Plane strain fracture toughness does not exist for this material.
3. Brittle fracture occurs under ambient pressure, whereas a considerable amount of stable crack growth occurs under 1000 psi confined pressure.
4. A power law relationship exists between the crack growth rate and the Mode I stress intensity factor.

Objectives

- Investigate the Effects of Specimen Thickness and Confined Pressure on the Crack Growth Behavior of a Particulate Composite.

- Specimen Thickness (in.): 0.2, 0.5, 1.0, 1.5.

- Confined Pressure (psi): Ambient, 1000.